

REMARKS

Claims 1, 8, 9, 11, 12 and 14-23 are pending. Claims 8, 11 and 12 have been withdrawn from consideration as being drawn to nonelected subject matter.

Issues Under 35 USC § 103

Claims 1, 9 and 14-22 remain rejected under 35 USC § 103 for being unpatentable over Fizet (US 5,487,817) in view of Willging (US 4,550,183), Hattori (WO 01/32682) and Hirata et al. (JP 09-176507). Applicants respectfully traverse the rejection.

Claim 1 is the only independent claim and recites as follows:

A method of extraction of phytosterols, squalene and vitamin E from crude palm oil comprising the steps of:

- a) conversion of crude palm oil into palm oil methyl esters;
- b) three short path distillation of crude palm oil methyl esters obtained in step (a) to yield phytonutrients concentrate;
- c) saponification of phytonutrients concentrate from step (b);
- d) crystallization of phytosterols;
- e) solvent partitioning of vitamin E and squalene. (Emphasis added).

The objective of the present invention is to make the palm oil based biodiesel (methyl esters) industry a viable industry at current high feedstock price. A step towards this end is that the inventive method minimizes the use of solvents in the purification steps by step-wise reducing the volume of sample.

Applicants respectfully submit that the inventive method is not taught or fairly suggested by the combination of Fizet, Willging, Hattori and Hirata et al.

As the Examiner will recall, in the December 7, 2007 Amendment, Applicants argued that the subject matter of the present application is a method of recovering vitamin E (tocopherols), Phytosterols and squalene from palm oil by first converting the fatty acids and/or glycerides in palm oil to methyl esters before subsequent recovery steps. On the other hand, Fizet's method includes first converting the fatty acids in deodorizer sludges or oils and fats to sterol esters before subsequent recovery steps.

In the Examiner's arguments as appearing in the outstanding Office Action, it appears that the Examiner is interpreting the instant claims too broadly. The Examiner has taken the position that the composition containing sterol esters is "crude palm oil" as presently claimed. As such, the Examiner has improperly taken the position that the step of Fizet of transesterification of sterol esters to methyl esters is the equivalent to converting crude palm oil into palm oil methyl esters, as presently claimed. See the sentence bridging pages 3-4 of the outstanding Office Action. As discussed in detail below, the "crude palm oil" of the present invention is different from the starting materials of Fizet.

Furthermore, Applicants respectfully submit that the references do not teach or fairly suggest the inventive order of steps. According to the language in step b), it is clear that step b) must follow step a). Step b recites "three short path distillation of crude palm oil methyl esters obtained in step (a) to yield phytonutrients concentrate."

However, Fizet only teaches that the methyl ester conversion step should take place after the second short path distillation step. This is in distinction to the present method wherein the crude palm oil methyl esters are subjected to three short path distillation steps.

Furthermore, the present invention requires both step a) [conversion to methyl esters] and step c) [a saponification of the product of step b)]. The Examiner relies on the description at col. 4, lines 24-39 and col. 5, lines 46-67 of Fizet for teaching a transesterification reaction for the formation of methyl esters. Also, the Examiner relies on the description at col. 4, lines 40-60 of Fizet for teaching a saponification step. However, Fizet teaches that the saponification step is an alternative to the transesterification reaction for the formation of methyl esters. At col. 4, line 28, Fizet uses the phrase "One such method" to refer to the method which includes the transesterification reaction for the formation of methyl esters. Also, at col. 4, line 40, Fizet uses the phrase "A further method" to refer to the method which includes the saponification step. As such, Fizet does NOT teach a method which includes both the saponification step and the transesterification reaction for the formation of methyl esters.

Based on the foregoing, it is clear that patentable distinctions exist between the inventive method and the teachings of Fizet. Applicants respectfully submit that the artisan would not find it obvious to modify the teachings of Fizet to include the teachings of Willging, Hattori and Hirata et al. in order to obtain the present invention.

As mentioned above, an objective of the present invention is to make the palm oil based biodiesel (methyl esters) industry a viable industry at current high feedstock price using crude palm oil (CPO) as the starting materials. This is all together a different objective when compared to the objectives of the cited documents which use a deodorizer distillate as the feedstock which is a by-product of a refinery.

In view of the fact that the present method starts with a different starting material than the cited references, the inventors designed a method for purifying/isolating phytosterols, squalene and vitamin E which is completely different from methods of the cited art. The starting material used in the present invention, which is CPO, is different as compared to deodorizer distillates. For instance, CPO is mainly tryglycerides whereas deodorizer distillates are mainly fatty acids. Furthermore, the concentration of vitamin E, sterols, and squalene (~0.05% mass) in the CPO is much lower than deodorizer distillate (0.5%-1.0%). In addition, the CPO contains heavy phase components, which are mainly phospholipids and colored pigment, which are not present in deodorizer distillates.

In the present invention, the removal of these heavy phase components, which are mainly phospholipids and colored pigment, is an important step in developing the inventive multi-step distillation process as these components are not present in deodorizer distillates. Thus, a multi-step distillation is important to eliminate contamination of these heavy phase components to get into the vitamin E, sterols and squalene fractions. Pre-separation of heavy phase components prior to further purification was found to be important to the inventive process, and this is just one aspect of the present method which is not taught or fairly suggested by Fizet, Willging, Hattori and Hirata et al.

Based on the present Inventors' in-depth understanding of the CPO, the present Inventors developed a successful process to recover these minor components of vitamin E, squalene and sterols. Also, understanding the chemistry of the final mixture of components was important (such as polarity and solubility of vitamin E, squalene and sterols in certain organic solvents) in order to design a suitable solvent system and sequence to recover these components in a suitable manner.

Based on the foregoing, a *prima facie* case of obviousness cannot be said to exist, and withdrawal of the rejection is respectfully requested.


In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq., Reg. No. 43,575 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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